

CLAIMS

- 1 1. A handpiece, comprising:
2 a handpiece assembly including a handpiece housing and a
3 cooling fluidic medium valve member; and
4 an electrode assembly coupled to the handpiece housing, the
5 electrode assembly including a least one RF electrode that is
6 capacitively coupled to a skin surface when at least a portion of the RF
7 electrode is in contact with the skin surface.
- 1 2. The handpiece of claim 1, further comprising:
2 a fluid delivery member coupled to the cooling fluidic medium
3 valve member, wherein the fluid delivery member is configured to
4 provide an atomizing delivery of a cooling fluidic medium to the RF
5 electrode.
- 1 3. The handpiece of claim 2, wherein the fluid delivery
2 member is positioned in the handpiece housing.
- 1 4. The handpiece of claim 2, wherein the fluid delivery
2 member is positioned in the electrode assembly.
- 1 5. The handpiece of claim 2, wherein the fluid delivery
2 member includes a nozzle.
- 1 6. The handpiece of claim 2, wherein the fluid delivery
2 member is configured to deliver a controllable amount of cooling fluidic
3 medium to the RF electrode.
- 1 7. The handpiece of claim 2, wherein the fluid delivery
2 member is configured to controllably deliver the cooling fluidic medium
3 to a back surface of the RF electrode.

1 16. The handpiece of claim 14, wherein the conductive
2 portion includes copper.

1 17. The handpiece of claim 14, wherein the dielectric portion
2 includes polyimide.

1 18. The handpiece of claim 14, wherein the RF electrode
2 includes a copper polyimide composite material.

1 19. The handpiece of claim 1, further comprising:
2 leads coupled to the RF electrode.

1 20. The handpiece of claim 1, wherein the RF electrode
2 includes a flex circuit.

1 21. The handpiece of claim 20, wherein the flex circuit is
2 configured to isolate flow of a cooling fluidic medium from a back
3 surface of the RF electrode to a front surface of the RF electrode.

1 22. The handpiece of claim 20, wherein the flex circuit is
2 configured to create a reservoir for a cooling fluidic medium that
3 gathers at a back surface of the RF electrode.

1 23. The handpiece of claim 20, wherein the flex circuit
2 includes trace components.

1 24. The handpiece of claim 20, wherein the flex circuit
2 include a force sensor coupled to the flex circuit.

1 25. The handpiece of claim 20, wherein the flex circuit
2 includes a thermal sensor.

1 26. The handpiece of claim 20, wherein the flex circuit
2 includes a dielectric that forms a portion of the RF electrode.

1 27. The handpiece of claim 1, further comprising:
2 a force sensor coupled to the RF electrode.

1 28. The handpiece of claim 27, wherein the force sensor is
2 configured to detect an amount of force applied by the RF electrode
3 against a surface.

1 29. The handpiece of claim 27, wherein the force sensor is
2 configured to zero out gravity effects of the weight of the electrode
3 assembly.

1 30. The handpiece of claim 27, wherein the force sensor is
2 configured to zero out gravity effects of the weight of the electrode
3 assembly in any orientation of a front surface of the RF electrode
4 relative to a direction of gravity.

1 31. The handpiece of claim 27, wherein the force sensor is
2 configured to provide an indication of RF electrode contact with a skin
3 surface.

1 32. The handpiece of claim 27, wherein the force sensor is
2 configured to provide a signal indicating that a force applied by the RF
3 electrode to a contacted skin surface is below a minimum threshold.

1 33. The handpiece of claim 27, wherein the force sensor is
2 configured to provide a signal indicating that a force applied by the RF
3 electrode to a contacted skin surface is above a maximum threshold.

1 34. The handpiece of claim 27, further comprising:

2 a tare button coupled to the force sensor.

1 35. The handpiece of claim 1, wherein the RF electrode is
2 spring loaded.

1 36. The handpiece of claim 35, wherein the spring is pre-
2 loaded.

1 37. The handpiece of claim 35, wherein the spring is
2 configured to bias the RF electrode in a direction toward the handpiece
3 housing.

1 38. The handpiece of claim 1, further comprising:
2 a shroud coupled to the handpiece.

1 39. The handpiece of claim 1, further comprising:
2 a RF electrode identifier.

1 40. The handpiece of claim 1, wherein the RF electrode
2 includes a conductive portion with a dielectric positioned around at
3 least a portion of a periphery of the conductive portion.

1 41. The handpiece of claim 1, wherein the RF electrode
2 includes a conductive portion with a dielectric positioned around an
3 entirety of a periphery of the conductive portion.

1 42. The handpiece of claim 1, wherein the electrode
2 assembly includes a cooling fluidic medium channel with an inlet and
3 an outlet.

1 43. The handpiece of claim 42, wherein the outlet of the
2 cooling fluidic medium channel has a smaller cross-sectional area than
3 a cross-sectional area of the inlet.

1 44. The handpiece of claim 1, wherein the electrode
2 assembly is moveable within at least a portion of the handpiece
3 housing.

1 45. The handpiece of claim 1, wherein the electrode
2 assembly is slideably moveable within at least a portion of the
3 handpiece housing.

1 46. The handpiece of claim 1, wherein the electrode
2 assembly is rotatably moveable relative to the handpiece housing.

1 47. The handpiece of claim 1, wherein the RF electrode is
2 rotatably positioned in the electrode assembly.

1 48. The handpiece of claim 1, wherein the electrode
2 assembly is coupled to the handpiece housing in a stationary position.

1 49. A handpiece, comprising:
2 a handpiece assembly including a handpiece housing and a
3 cooling fluidic medium valve member with an inlet and an outlet; and
4 an electrode assembly removably coupled to the handpiece
5 housing, the electrode assembly including a least one RF electrode with
6 a front surface and a back surface, wherein the RF electrode is
7 capacitively coupled to a skin surface when at least a portion of the RF
8 electrode is in contact with the skin surface.

1 50. The handpiece of claim 49, further comprising:
2 a fluid delivery member coupled to the cooling fluidic medium
3 valve member, wherein the fluid delivery member is configured to
4 provide an atomizing delivery of a cooling fluidic medium to the RF
5 electrode.

1 51. The handpiece of claim 50, wherein the fluid delivery
2 member is positioned in the handpiece housing.

1 52. The handpiece of claim 50, wherein the fluid delivery
2 member is positioned in the electrode assembly.

1 53. The handpiece of claim 50, wherein the fluid delivery
2 member includes a nozzle.

1 54. The handpiece of claim 50, wherein the fluid delivery
2 member is configured to deliver a controllable amount of cooling fluidic
3 medium to the RF electrode.

1 55. The handpiece of claim 50, wherein the fluid delivery
2 member is configured to controllably deliver the cooling fluidic medium
3 to the back surface of the RF electrode.

1 56. The handpiece of claim 50, wherein the fluid delivery
2 member is configured to controllably deliver fluid to a backside of the
3 RF electrode to evaporatively cool the RF electrode and conductively
4 cool a skin surface in contact with the front side of the RF electrode.

1 57. The handpiece of claim 50, wherein the fluid delivery
2 member is configured to controllably deliver a cooling fluidic medium to
3 the back surface of the RF electrode at substantially any orientation of
4 the front surface of the RF electrode relative to a direction of gravity.

1 58. The handpiece of claim 49, wherein the electrode
2 assembly is sufficiently sealed to minimize flow of a cooling fluidic
3 medium from the back surface of the RF electrode to a skin surface in
4 contact with the front surface of the RF electrode.

1 59. The handpiece of claim 49, wherein the electrode
2 assembly includes a vent.

1 60. The handpiece of claim 49, wherein the cooling fluidic
2 medium valve member is configured to provide a pulsed delivery of a
3 cooling fluidic medium.

1 61. The handpiece of claim 49, wherein the cooling fluidic
2 medium valve member includes a solenoid valve.

1 62. The handpiece of claim 50, wherein the fluid delivery
2 member is configured to deliver a sufficient amount of cooling fluidic
3 medium to controllably maintain the back surface of the RF electrode
4 at a desired temperature.

1 63. The handpiece of claim 50, wherein the fluid delivery
2 member is configured to controllably deliver a sufficient of cooling
3 fluidic medium to the back surface of the RF electrode and maintain a
4 substantially uniform temperature of the front surface of the RF
5 electrode.

1 64. The handpiece of claim 49, further comprising:
2 a thermal sensor coupled to the RF electrode.

1 65. The handpiece of claim 49, further comprising:
2 a plurality of thermal sensors coupled to the RF electrode.

1 66. The handpiece of claim 49, further comprising:
2 four thermal sensors coupled to the RF electrode.

1 67. The handpiece of claim 64, wherein the sensor is
2 positioned at the back surface of the RF electrode.

1 68. The handpiece of claim 64, wherein the sensor is
2 electrically isolated from the RF electrode.

1 69. The handpiece of claim 64, wherein the sensor is selected
2 from a thermocouple, thermistor, infrared photo-emitter and a
3 thermally sensitive diode.

1 70. The handpiece of claim 49, wherein the outlet of the
2 cooling fluidic medium valve member is distanced from the back
3 surface of the RF electrode.

1 71. The handpiece of claim 49, wherein a geometry and a
2 positioning of the fluid delivery member are selected to provide a
3 substantially uniform distribution of fluid on the back surface of the RF
4 electrode.

1 72. The handpiece of claim 49, wherein the RF electrode has
2 a thickness in the range of 0.010 to 1.0 mm.

1 73. A handpiece, comprising:
2 a handpiece assembly including a handpiece housing;
3 an insert at least partially positionable in the handpiece housing;
4 an RF electrode coupled to the insert, the RF electrode including
5 a back surface facing the handpiece housing and an opposing front
6 surface; and
7 a cooling fluidic medium dispensing assembly coupled to the
8 handpiece housing and the insert.

1 74. The handpiece of claim 73, wherein the cooling fluidic
2 medium dispensing assembly includes a fluid delivery member coupled
3 to a cooling fluidic medium valve member.

1 75. The handpiece of claim 74, wherein the cooling fluidic
2 medium valve member is positioned in the handpiece housing.

1 76. The handpiece of claim 74, wherein the cooling fluidic
2 medium valve member is positioned in the electrode assembly.

1 77. The handpiece of claim 74, wherein the fluid delivery
2 member is positioned in the handpiece housing.

1 78. The handpiece of claim 74, wherein the fluid delivery
2 member is positioned in the insert.

1 79. The handpiece of claim 74, wherein the fluid delivery
2 member includes a nozzle.

1 80. The handpiece of claim 74, wherein the fluid delivery
2 member is configured to deliver a controllable amount of cooling fluidic
3 medium to the RF electrode.

1 81. The handpiece of claim 74, wherein the fluid delivery
2 member is configured to controllably deliver a cooling fluidic medium to
3 the back surface of the RF electrode.

1 82. The handpiece of claim 74, wherein the fluid delivery
2 member is configured to controllably deliver fluid to a backside of the
3 RF electrode to evaporatively cool the RF electrode and conductively
4 cool a skin surface in contact with the front side of the RF electrode.

1 83. The handpiece of claim 74, wherein the fluid delivery
2 member is configured to controllably deliver a cooling fluidic medium to
3 the back surface of the RF electrode at substantially any orientation of
4 the front surface of the RF electrode relative to a direction of gravity.

1 84. The handpiece of claim 74, wherein the RF electrode is
2 sufficiently sealed to minimize flow of a cooling fluidic medium from
3 the back surface of the RF electrode to a skin surface in contact with
4 the front surface of the RF electrode.

1 85. The handpiece of claim 53, wherein the insert includes a
2 vent.

1 86. The handpiece of claim 74, wherein the cooling fluidic
2 medium valve member is configured to provide a pulsed delivery of a
3 cooling fluidic medium.

1 87. The handpiece of claim 74, wherein the cooling fluidic
2 medium valve member includes a solenoid valve.

1 88. The handpiece of claim 73, wherein the front surface of
2 the RF electrode is configured to conductively cool a skin surface in
3 contact with the front surface of the RF electrode at substantially any
4 orientation of the front surface of the RF electrode relative to a
5 direction of gravity.

1 89. The handpiece of claim 74, wherein the front surface of
2 the RF electrode and the cooling fluidic medium delivery member are
3 configured to conductively cool a skin surface in contact with the front
4 surface of the RF electrode at substantially any orientation of the front
5 surface of the RF electrode relative to a direction of gravity.

1 90. The handpiece of claim 73, wherein the RF electrode
2 includes a conductive portion and a dielectric.

1 91. The handpiece of claim 73, wherein the RF electrode
2 includes a conductive portion with a dielectric positioned around at
3 least a portion of a periphery of the conductive portion.

1 92. The handpiece of claim 73, wherein the RF electrode
2 includes a conductive portion with a dielectric positioned around an
3 entirety of a periphery of the conductive portion.

1 93. The handpiece of claim 73, wherein the insert is
2 removably coupled to the handpiece housing.

1 94. The handpiece of claim 93, further comprising:
2 a non-volatile memory coupled to the insert.

1 95. The handpiece of claim 94, wherein the non-volatile
2 memory is an EPROM.

1 96. The handpiece of claim 73, further comprising:
2 a non-volatile memory coupled to the handpiece housing.

1 97. The handpiece of claim 96, wherein the non-volatile
2 memory is an EPROM.

1 98. The handpiece of claim 73, wherein the handpiece
2 housing includes a microprocessor.

1 99. The handpiece of claim 94, wherein the non-volatile
2 memory provides control of current delivered to the RF electrode.

1 100. The handpiece of claim 94, wherein the non-volatile
2 memory provides control of duty cycle of the cooling fluidic medium
3 delivery member.

1 101. The handpiece of claim 94, wherein the non-volatile
2 memory provides control of energy delivery duration time from the RF
3 electrode.

1 102. The handpiece of claim 94, wherein the non-volatile
2 memory controls the temperature of the front surface of the RF
3 electrode relative to a target temperature.

1 103. The handpiece of claim 94, wherein the non-volatile
2 memory provides a maximum number of firings of the RF electrode.

1 104. The handpiece of claim 94, wherein the non-volatile
2 memory provides a maximum allowed voltage deliverable by the RF
3 electrode.

1 105. The handpiece of claim 94, wherein the non-volatile
2 memory provides a history of RF electrode use.

1 106. The handpiece of claim 94, wherein the non-volatile
2 memory is configured to provide a controllable duty cycle to the
3 cooling fluidic medium delivery member for the delivery of cooling
4 fluidic medium to the back surface of the RF electrode.

1 107. The handpiece of claim 94, wherein the non-volatile
2 memory is configured to provide a controllable delivery rate of cooling
3 fluidic medium delivered from the cooling fluidic medium delivery
4 member to the back surface of the RF electrode.

1 108. The handpiece of claim 74, wherein the RF electrode and
2 the fluid delivery member are configured to provide a uniform heat
3 removal from the front surface of the RF electrode when the front
4 surface of the RF electrode is applied to a skin surface.

1 109. The handpiece of claim 74, wherein the RF electrode and
2 the fluid delivery member are configured to provide a uniform heat
3 removal from that portion of the front surface of the RF electrode
4 applied to a skin surface.

1 110. The handpiece of claim 74, wherein the RF electrode and
2 the fluid delivery member are configured to provide a uniform heat
3 removal from that portion of the front surface of the RF electrode
4 applied to a skin surface at substantially any orientation of the from
5 surface of the RF electrode relative to a direction of gravity.

1 111. The handpiece of claim 74, wherein the RF electrode and
2 the fluid delivery member are configured to conductively cool a skin
3 surface in contact with the front surface of the RF electrode.